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Miriam Olivia Knopik Ferraz
Doctoral student, Pontifical Catholic University of Paraná, Brazil with double degree at University of Rome Sapienza – La Sapienza, Italy
https://orcid.org/0000-0002-3350-5502
m.okf@hotmail.com

Oksandro Gonçalves
Professor, Pontifical Catholic University of Paraná, Brazil
https://orcid.org/0000-0002-6873-5156
oksandro.gonçalves@pucpr.edu.br

Regulation of international space law to promote economic and social development[1]

Introduction

The conquest of space took on a new dimension in the 21st century, far beyond the arrival on the Moon. In the last decades, the project for the development of space services began to be considered by several developed countries, reaching different proportions in investment, size and degree of expansion. This appreciation justifies in-depth studies on the theme of regulating these activities and how the law can act to direct these interests, both public and private, to promote international economic and social development. In order to understand the role of law, while regulating these private businesses or public investments, there is a need to debate the limits and possibilities of state intervention and which way to go. To this end, the work was subdivided into three parts: the study of international space law and current businesses, thus proving the diverse niches in which this market operates and how crucial these initiatives are today in human experiences, from controlling harvests to contain natural disasters. At the same time, several regulatory frameworks contribute to the legal understanding of the topic and, mainly, what are the objectives that should be followed in the exploration and use of space.

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International space law and current affairs

The first phase of space exploration was a consequence of the political and economic situation at the end of the Second World War, with two powers that began to antagonize socioeconomic models: the now extinct Union of Soviet Republics (USSR), with a communist model; and, on the other hand, the United States, with a democratic model based on the free market.

In terms of advances or scientific milestones, the beginning of space exploration took place with the artificial satellite Sputnik 1, launched by the Soviet Union on Oct. 4th, 1957, and which represented a "departure signal and the beginning of the space race". During this period, this race was not prioritized, until the moment when the United States and the Soviet Socialist Republics (USSR) realized that satellites could be used to obtain images of enemy territory, without the compromise of airplanes. Several initiatives were carried out with the launch of satellites until the consolidation of the Apollo Project by President John Kennedy in 1961. In this framework he launched the challenge of sending man to the Moon in 10 years. The race for the Moon began, which was carried out in 1968 by the United States, and which will be adopted in this work as a historical landmark.

After the arrival of man on the Moon, the next phase of space exploration was centered on the use and proliferation of satellites. Thus, the development of space exploration has moved towards the enhancement of satellite infrastructure, several countries have started to have their own structures for receiving satellite data and more than 40 have acquired spatial control of their telecommunications satellites.[2] In 2021, Brazil launched its first satellite "completely designed, integrated, tested and operated by Brazil":[3] Amazonia 1, considered a milestone for Brazilian space autonomy. It is noted that as in the economy, several emerging nations have started to conquer their space, presence and relevance in the international scenario, countries such as China and India, although they do not act as prominently as the European bloc and the United States, come acquiring scientific and technological skills for the construction of satellites and advancing access to space by means of rockets and launchers.[4]

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2 B. Montluc, "The new international political and strategic context for space policies", *Space Policy*, 2009, vol. 25, no. 1, pp. 20–28.

3 INPE [Instituto Nacional de Pesquisas Espaciais], "Lançado com sucesso o Amazonia 1, primeiro satélite nacional de observação da Terra", 28 February 2021, http://www.inpe.br/noticias/noticia.php?Cod_Noticia=5706 [accessed: 7 April 2021].

4 F. de Holanda Schmidt, *Desafios e oportunidades para uma indústria espacial emergente: o caso do Brasil*, Brasilia: IPEA, 2011.

At this point, it should be noted that space is seen as a commodity in common use, without exactly having a holder, so much so that there are express provisions on non-appropriation due to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Cosmic Space Including the Moon and Other Celestial Bodies, known as the 1967 Space Treaty. Although the concept of airspace exists, the delimitation of the dividing line between airspace and space still promotes great discussions and no definition.[5] Legal uncertainty has not prevented the satellite process, based on the idea of an infinite good little subject to scarcity, which turns out to be an error, since the number of satellites existing today around the Earth already leads to studies on the growing formation of space waste.

There is a possible occurrence of the "tragedy of the commons", which can be explained briefly in the idea of common pasture, that is, space is a common good open to all and each one ends up placing another animal in this pasture, that is, , one more satellite to the point that the common good ends up overloaded. This notion is likely to be glimpsed in space, especially with regard to the route and positioning of satellites around the terrestrial globe, which today overload the atmosphere and can cause losses, as the International Astronomical Union warns, which expressed its concern about the negative impacts of mega constellations of communication satellites are already causing astronomical observations and the appearance of the night sky when viewed from a dark region.[6] Based on the idea of the common good, the debate begins about the need or not for the regulation of space exploration, which has a strong international focus, given its peculiarities. Then, the International Space Law is developing, which has been gaining strength and the need for expansion in the present times. In the 1960s, the "United Nation's Committee on the Peaceful Uses of Outer Spaces (COPUOS)" was created and the most relevant instrument produced was the "Declaration as Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space", the Space Treaty. This committee continued to produce various materials that today underlie Space Law.

The fundamental and customary principles of Space Law were formulated by COPUOS in regulations (without binding character), but that guide the relations that have developed until today and were incorporated in the Outer Space Treaty (OST), this one, ratified by several countries, based on the

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5 J. Monserrat Filho, *Direito e Política na Era Espacial*, Rio de Janeiro: Vieira & Lent, 2007, p. 31.

6 IAU [International Astronomical Union], "Understanding the Impact of Satellite Constellations on Astronomy", 2019, IAU NEWS, https://www.iau.org/news/pressreleases/detail/iau2001/ [accessed: 24 April 2021].

principles of free exploitation for the benefit of humanity, non-appropriation, exploitation for peaceful purposes, international cooperation, among others.[7]

After this milestone, several treaties were developed for the treatment and regulation of specific topics, such as the use of the Moon, celestial bodies and in the scope of telecommunications, etc. The idea of universal regulation proposed by the UN considered the nature of the organ itself, that is, a worldwide idea for space based on freedom of exploration, but with a certain social function, as the benefits should be shared with all humanity. It was also an attempt to avoid militarization of the topic, emphasizing its use for peaceful purposes and to analyze possible accountability. The theme returns to a new scale of importance from the moment that private companies start to develop space exploration projects. The various exploratory potentialities drew the attention of private companies, which then began to develop their own action plans, causing, in the last decade (2010–2020), a period of great expansion of this new business model.

Economic and social development

The interaction between development and democracy was the subject of discussion in the XX without reaching a conclusion, so it is possible to list three groups that represent the theories about development:[8] i. theorists of market imperfections that restrict their analysis in pointing out the flaws at the micro or macroeconomic level;[9] ii. the New Institutional Economics School that seeks to understand new fields of study that make it impossible for markets to function properly;[10] iii. theorists who point to development as the process of expanding freedoms, are based on human, economic and productive growth rates. In this work, the last group will be approached as a theoretical reference.

The emergence of the current occurred in the search for new ways of conceiving development, addressing factors in addition to conventional economics, since it is possible that a country has these high rates and is very poor in

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7 2222 (XXI). Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 19 December 1966, United Nations, http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html [accessed: 24 April 2021].

8 L. Bonemer Azecvedo da Rocha*, O desenvolvimento econômico pelo acesso à justiça*, Birigui: Boreal Editora, 2015, p. 6.

9 C. Abrantkoski Rister, *Direito ao desenvolvimento – antecedentes, significados e consequências*, Rio de Janeiro: Renovar, 2007, pp. 27–28.

10 D.C. North, "Economic Performance Through Time Source", *The American Economic Review*, 1994, vol. 84, no. 3 (June), pp. 359–368.

the quality of life of its inhabitants[11], with variations for example in the GINI index.[12]

In this segment, the third strand is built, based on Amartya Sen's theory that defines development as "a process of expansion of real freedoms that people enjoy".[13] For the author, it is necessary to envision development in a much broader way than just the dimension of the Gross Domestic Product (GDP), that is, the economic bias is not the definition of development. On the other hand, development "demands socio-economic structural changes that imply a qualitative improvement in the living standards of citizens, providing an increase in social well-being".[14] Therefore, a study of the quantitative and qualitative sense is necessary to be able to adequately measure economic and social development. Sen's objective is to strengthen the development of instrumental freedoms (policies, economic facilities, social opportunities, guarantees of transparency and protective security), which allow people to reach the status of agent and, thus, can act positively in their own life. Part of this process is to understand that not only do global actions bring social reflexes, but also specific initiatives have the power to transform and achieve far-reaching results.[15]

To achieve this development, it is necessary to remove deprivations of liberty that can limit people. Sen's objective is to demand from the State the prioritization of agendas that expand people's freedom and, thus, offering real conditions for the expansion of the condition of agency. It is noteworthy that this is the position in which the individual acts and causes changes, and chooses the life he believes to be the best to be lived, that is, the judgment of these actions is on the perspective of the individual himself, regardless of external criteria.[16] It is noted that the use of mixed development indicators

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11 A. Sen, "O desenvolvimento como expansão de capacidades", *Lua Nova*, 1993, n.º 28–29, pp. 313–334, http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-64451993000100016&lng=en&nrm=iso [accessed: 24 April 2021].

12 The Gini index is an instrument to measure the degree of concentration of income in a given group and, thus, it points out the difference between the income of the poorest and the richest. See: A. Wolffenbüttel, *O que é? Índice de Gini*, Ipea [Instituto de Pesquisa Econômica Aplicada], 2004, ano 1, n.º 4–1/11, https://www.ipea.gov.br/desafios/index.php?option=com_content&id=2048:catid=28 [accessed: 24 April 2021].

13 A. Sen, *Desenvolvimento como liberdade*, tradução: L. Teixeira Motta, revisão técnica: R. Dniselli Mendes, São Paulo: Companhia das Letras, 2000, p. 17.

14 D. Wunder Hachem, "A noção constitucional de desenvolvimento para além do viés econômico: reflexos sobre algumas tendências do Direito Público brasileiro," *A&C – Revista de Direito Administrativo & Constitucional, Belo Horizonte*, 2013, ano 13, n.º 53, pp. 133–168.

15 A. Sen, *Desenvolvimento como liberdade*..., *op. cit*., p. 234.

16 *Ibidem*, p. 62.

that consider not only the economic aspect, but also social aspects, promote the improvement of tools that assist in the decision-making of public policies.[17]

Regulation on space exploration as a promotion mechanism for international economic and social development

In space explorations, state intervention predominated. Although the process of conquering space involved some private companies, this is within the scope of the provision of services and technology, but as it involved national security, the issue was under the unrestricted control of the State. However, now there is a large insertion of private companies, which makes the regulatory activity essential to make the interests involved compatible.[18] The broad contours of this industry are criticized for not differentiating the satellite production industry from the service industry derived from them. The Satellite Industry Association (SIA) identifies the "satellite industry" as a subset of companies that operate at the intersection between the space industry and the telecommunications industry in general, on the other hand the British National Space Center (BNSC) divides the industry into an upstream sector that corresponds to the companies that provide space technology, and another sector, the downstream, composed of companies that use it. The association of all these sectors in one result in a significant movement of values.

The relationship between law and development has been the subject of study by Kevin Davis and Michael Trebilcook regarding whether or not there is an influence of law on the promotion of economic development: on the one hand, optimistic authors who believe that certain characteristics of a country's legal system have a role important in determining development prospects; on the other hand, the criticisms are varied: it is disputed that it is possible for legal operators to identify and implement legal reforms to promote development; contest the possibility of making significant legal changes, given the political, historical, economic and cultural obstacles; and finally, the most skeptical contest the role of law as significant for development.[19]

In fact, the adoption of development-oriented policies cannot be done in isolation, but with the rethinking of the structures of law. In this sense, there is

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17 H.M. Van Bellen, *Indicadores de sustentabilidade: uma análise comparativa*, 2. ed., Rio de Janeiro: FGV, 2006.

18 A.B. Floriani Neto, O.O. Gonçalves, "A regulação do meio ambiente de trabalho como um mecanismo de promoção do desenvolvimento", *Revista Jurídica Luso-Brasileira*, 2018, ano 4, n.º 3, pp. 169–192.

19 K.E. Davis, M.J. Trebilcock, "A relação entre direito e desenvolvimento: otimistas versus céticos", *Revista Direito GV*, 2009, vol. 5, n.º 1, p. 222.

a need to propose joint action between state and private entities, which play an essential role in the emergence and development of technological innovations, a theme that is extremely correlated with space exploration.

Therefore, the most appropriate alternative is through the cooperation of agents in their respective quadrants and, not in isolation, as the US Commercial Space Launch Competitiveness Act[20] signed in 2015, which aimed at allowing private exploration of space, the appropriation of asteroids and other space resources by individuals and companies. This legislation opened space for the exploratory race currently carried out by the company SpaceX and Orbital ATK with cargo missions to the International Space Station and plans beyond Earth's orbit. The monopolies that can be formed may give rise to discussions and legal regulations in international competition law,[21] a reflex that has already been felt in the internationalization of companies that are now moving towards the exploration of a significantly unregulated space. Here the problem of the tragedy of common goods is renewed, because as technological advances occur and become more accessible, the tendency is for more players to fill the spaces of this new market which, being deregulated and based on the belief of the infinite universe, end up generating an overuse of goods leading to exhaustion and, consequently, scarcity.

In relation to Brazil, it is possible to list some economic and social impacts of the use of satellites for meteorology, in a research carried out by Edson Baptista Teracine (1999, pp. 58–59), showed increases of 5 to 20% in productivity, due to the use of weather forecasts. In this sense, the understanding of both economic and social development will essentially go through regulations and valorization of scientific research and innovation, since the improvement of the spatial infrastructure leads to the empowerment of national States with positive consequences for individuals.

Conclusions

There is much to discover in space. For the time being, the activities carried out that strengthen and consolidate this branch of infrastructure have already shown to have major impacts on society, states and companies. It is positioned in this work that the function of Law, in the face of this constantly improving

[20] U.S. Commercial Space Launch Competitiveness Act, Public Law, 25 November 2015, United States, https://www.congress.gov/114/plaws/publ90/PLAW-114publ90.pdf [accessed: 24 April 2021].

[21] A.T. Guzman, "Antitrust and international regulatory federalism", *New York University Law Review*, 2011, vol. 76, pp. 1142–1163; L. Cuéllar, Abuso de Posição dominante no direito de concorrência brasileiro [in:] L. Cuéllar, E. Bockmann Moreira, *Estudos de Direito Econômico*, Belo Horizonte: Fórum, 2010.

reality, is to consolidate mechanisms to stimulate scientific and technological progress and, also, to base the actions always on with the objective of promoting economic and social development. In this sense, the existing competition between private companies and public initiatives demands and will keep demanding regulations at the regional and international level, the possibilities and limits should be discussed in a tripartite manner: States, Society and Companies. From the analysis carried out it was possible to conclude that there are private and public actors in this space exploratory market in competition as well as in mutual assistance. Regulation has the essential role of directing the performance of both towards the fulfillment of the development objectives contained in Sen's theory. Thus, the first step is to defend the conceptual choice of development, which is intended to position the development as freedom. In a second moment, it is understood that this concept of development necessarily implies the establishment of institutions, and these are very much connected with the State, there is a lot of dialogue between them. Finally, the performance of the State must necessarily be guided by the regulation of space infrastructure, and this regulation must aim at economic and social development in a way that is compatible with Sen's theory.

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Abstract

Regulation of international space law to promote economic and social development

The objective of the article is to evaluate the role of the regulation of international space law for the realization of international economic and social development. Aiming for that, a logical-deductive methodology was used, through bibliographic research to map relevant issues about the spatial infrastructure and the current understanding of social economic development. In this sense, the study was carried out through its development in three parts: first the mapping of international space law to demonstrate the progress of investments and activities that are carried out around the space infrastructure; in a second step, the interaction between economic and social development and brief economic discussions about the market and state action are analyzed; finally, it deals with the importance of regulation on space exploration as a promotion mechanism for international economic and social development. It was concluded that there are private and public actors in this exploratory market and their actions must occur together, as they often occur within countries, aiming to promote economic development as freedom, and that the State's action must be guided by the regulation of space infrastructure; this regulation must aim at economic and social development in a way that is compatible with Amartya Sen's theory.
Key words: International Space Law, Economic Development, Social Development